

# THE DEVELOPMENT OF THE STETHOSCOPE

## AN EXHIBITION

SHOWING THE WORK OF LAENNEC AND HIS SUCCESSORS  
HELD IN THE LIBRARY FEBRUARY 13 TO MARCH 29, 1935

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and  
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This exhibition was prepared, not as an exhaustive study of the stethoscope's history, but more as a survey of the salient points in the development of the instrument. The Academy's Historical Museum possessed several early and later stethoscopes. These were supplemented by material kindly lent by friends and interested institutions. An effort was made to show illustrations, if the instruments were not available. Failing both, a description was given, if possible that by the originator.

The Bibliographical Department of the Library has been very helpful in assembling the material for exhibition and in the preparation of this account, and the Librarian made numerous interested suggestions—to both of whom we are grateful.

### *Laennec and the First Stethoscope*

RENÉ THÉOPHILE HYACINTHE LAENNEC (1781-1826)

In 1816 Laennec, a struggling physician of thirty-five, was working hard in the wards of the Paris hospitals. Physical diagnosis as practiced today hardly existed then. Percussion was scoffed at by all but a few. Physicians were just beginning to use watches in counting the pulse. Auscultation consisted merely in listening with the naked ear against the chest wall. Little was understood of what was heard. Infrequently heart sounds were intensified by placing a short *solid* wooden rod between the precordium and the examiner's ear.

While examining a patient's chest Laennec wished to employ such a rod. None being at hand, he attempted to improvise one by rolling sheets of paper into a solid roll. He was not quite successful and a small air space remained in the center of the roll. This *accident* resulted in the birth of the stethoscope, for the heart sounds were conducted to his listening ear as no solid rod had ever done. Astonished at the improvement, he set about experimenting with hollow rods of various materials, eventually selecting one of wood.

During the next three years he worked patiently correlating what he noted on physical examinations with what he saw at autopsy. The result was his book: *Traité de l'Auscultation Médiate et des Maladies des Poumons et du Cœur*, published in 1819. This is said to be the most important treatise on the thoracic organs ever written. In it he placed before the medical world the first descriptions and differential diagnoses of bronchiectasis, pneumothorax, hemorrhagic pleurisy, pulmonary gangrene, infarct, emphysema, and esophagitis. Even the terms he originated endure, such as "egophony," "pectoriloquy," "sonorous and sibilant râles."

Laennec was one of the greatest teachers of tuberculosis of all times. Because of the merit of his work he was honored and recognized as a great clinician and pathologist. He worked on at his study for seven years more, to die himself of pulmonary tuberculosis at forty-five, undoubtedly the victim of his labors.

#### 1. LAENNEC'S FIRST PRESENTATION OF HIS NEW METHOD (1818).

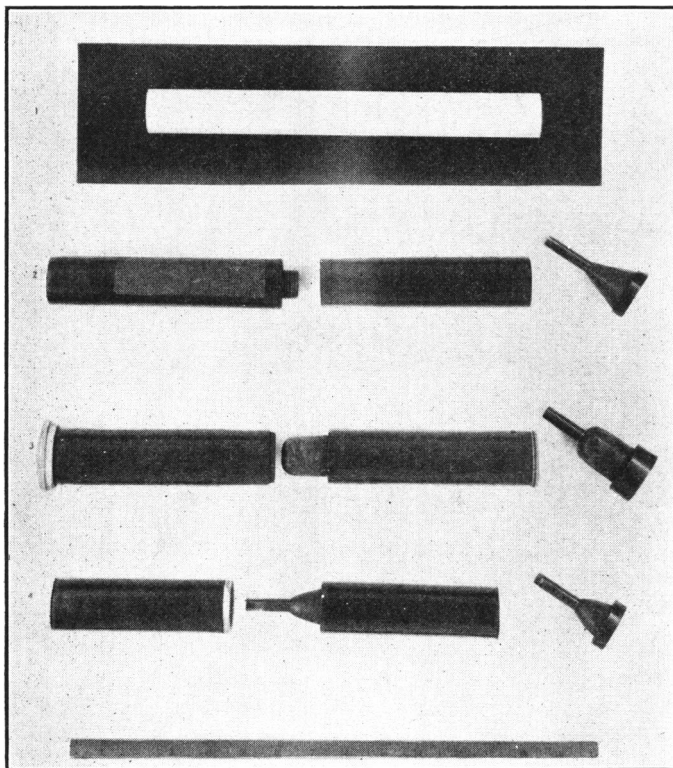
L'art d'explorer les maladies du thorax au moyen de l'auscultation.  
*Mém. de l'Acad. roy. d. sc. de l'Inst. de France* (1818), 3: pp. ccxxi-ccxxiii, 1820.

On Feb. 28, 1818 Laennec submitted the results of his labors to the Académie des Sciences, which received them, it is said, with respect but without the slightest trace of enthusiasm. They were not published until 1820 and then only in the form of the Secretary's notes.

## 2. FIRST PUBLISHED ACCOUNT (1818).

Mémoire sur l'auscultation à l'aide de divers instrumens d'acoustique . . . *Bull. Fac. de méd. de Paris*, 1818, pp. 129; 156; 171.

Laennec's lecture was read before the Faculté de Médecine, May 1 and 14, June 11, and July 9, 1818. It was not printed in full but merely noted.



## 3. ROLL OF PAPER LIKE LAENNEC'S (Fig. 1).

Cylinder or roll of paper, 16 "lignes" (a ligne is 1/12 of an inch) in diameter and 1 foot in length, formed of 3 notebooks of "beaten" paper rolled up very tightly, held together by gummed paper, and flattened out with a file at both ends. It is related that what first attracted Laennec's attention to the use of a hollow tube for auscultation was when passing through the court of the Louvre he saw some children playing about a long beam, and one would put his ear to the end of the beam and listen while the others tapped it lightly. Described by Laennec in *De l'auscultation médiate*, 1819, 1:8-9.

4. WOODEN STETHOSCOPE LIKE LAENNEC'S FIRST MODEL (Fig. 2).

Originally brought from Paris by Dr. Henry Ingersoll Bowditch, who studied under Louis, 1832-1834, and there imbibed the teachings of Laennec.

Presented to the Trudeau School by his son, Dr. Vincent Y. Bowditch in 1916.

Kindly loaned by the Trudeau Sanatorium.

5. FIRST EDITION OF LAENNEC'S BOOK ON AUSCULTATION (1819).

*De l'auscultation médiate, ou traité du diagnostic des maladies des poumons et du coeur, fondé principalement sur ce nouveau moyen d'exploration.* Paris, J. A. Brosson & J. S. Chaudé, 1819. 2 v.

This was Laennec's masterpiece. Two editions appeared during his lifetime.

6. TRANSLATION OF THE FIRST EDITION OF LAENNEC'S BOOK (1821).

*A treatise on the diseases of the chest, in which they are described according to their anatomical characters and their diagnosis established on a new principle by means of acoustick instruments. Translated . . . with a preface and notes by John Forbes.* London, T. & G. Underwood, 1821.

Appearing two years after the publication of the first French edition, this translation did much to introduce and popularize the stethoscope and Laennec's work in England.

Forbes became a leading consultant in tuberculosis.

7. SECOND EDITION OF LAENNEC'S BOOK ON AUSCULTATION (1826).

*Traité de l'auscultation médiate et des maladies des poumons et du coeur.* Paris, J. S. Chaudé, 1826. 2 v.

Garrison's comparison, taken from the third edition, 1921, of his *Introduction to the History of Medicine*, is pertinent enough to quote:

"In the first edition (1819), Laennec pursues the analytic method, giving the different signs elicited by percussion and auscultation, with the corresponding anatomic lesions (he was an expert pathologist). In the second edition (1823) [sic.], the process is turned about and the method is synthetic, each disease being described in detail in respect of diagnosis, pathology, and (most intelligent) treatment, so that this edition is, in effect, the most important treatise on diseases of the thoracic organs that was ever written."

8. TRANSLATION OF SELECTED PASSAGES FROM LAENNEC'S BOOK.

*Translation of selected passages from "De l'auscultation médiate" (first edition). With a biography by William Hale-White. London, John Bale, Sons & Danielsson, 1923.*

An excellent translation of Laennec's book. It also contains the story of Laennec's life with illustrations.

9. GOOD, BRIEF ARTICLES ON LAENNEC AND THE STETHOSCOPE.

Morgan, James Dudley (1862-1919).

Laennec: the great internist. *Washington M. Ann.* 9:250-258, 1910.

Lamb, Daniel Smith (1843-1929).

The stethoscope: a history. *Washington M. Ann.* 9:260-269, 1910.

Camac, Charles Nicoll Bancker (1868- ).

Laennec and his stethoscope. *M. News*, 86:918-923, 1905.

10. EARLY CONTEMPORARY COMMENT (1818).

N[acquart], J. B.

Des instrumens en médecine. *J. gén. de méd.* . . . 64:135-136, 1818.

This amusing commentary was written a few months after Laennec's announcement of his discovery.

11. TWO STETHOSCOPES CONTEMPORARY WITH LAENNEC (1819?) (Fig. 3).

Stethoscopes such as Laennec used. The original cylinder model was cut in two for convenience. The pectoral end is hollowed out. The wooden plug was fitted into the pectoral end when listening for heart sounds.

## 12. AN EARLY MODIFICATION OF LAENNEC'S STETHOSCOPE (1820) (Fig. 4).

Haden's modification of Laennec's stethoscope. The metal tube makes for a firmer joint than in the earlier models. Charles T. Haden, a physician who worked at the lathe with Laennec, introduced the stethoscope into England.

## 13. LAENNEC'S MODIFICATION (Fig. 5).

Laennec, in improving his stethoscope, probably went no further than this type, a shorter, somewhat flaring, unjointed wooden tube with an ear-piece.

## 14. PORTRAIT OF LAENNEC.

*Laennec à l'Hôpital Necker ausculte un phtisique.* 1816. Mezzotint after painting (?) by T. Chartrem. Kindly loaned by Dr. J. A. Miller.

### *Laennec's Immediate Successors*

## 15. PIORRY'S ADAPTATION (1828).

Piorry, Pierre Adolphe (1794-1879).

*De la percussion médiate et des signes obtenus à l'aide de ce nouveau moyen d'exploration dans les maladies des organes thoraciques et abdominaux.* Paris, J. S. Chaudé, 1828.

Opened at plate showing illustrations of Piorry's stethoscope with various pleximeters.

16. PIORRY'S STETHOSCOPE (1828) (Fig. 6).

A remarkably well preserved Piorry stethoscope. Photograph shows the same instrument as assembled when not in use. An extra wooden tube could be added if desired. The wooden cone was inserted into the pectoral end for cardiac examinations. The disc is a pleximeter, an invention of Piorry. This represented the first type of easily portable instrument. It was first made in 1828 and was the type most in use up to 1883. Ivory was introduced into the manufacture of stethoscopes in 1834.

17. FIRST SEMI-FLEXIBLE STETHOSCOPE (1829).

Comins, Nicholas P.

New stethoscope. *London M. Gaz.*, 4:427-430, 1829.

In 1829 Nicholas P. Comins of Edinburgh, in a letter to the editor of the *London Medical Gazette*, reported his invention of the first flexible stethoscope. As shown in the illustration (p. 428) it consisted of jointed wooden tubes which could be adjusted to varying angles in one plane, so that the examiner's face need not be directly over the patient's. This was often desirable because of the advanced stage of tuberculosis from which many of the patients suffered.

18. ADAPTATION OF COMINS' STETHOSCOPE (1829).

Comins, Nicholas P.

New stethoscope. *London M. Gaz.*, 4:427-430, 1829.

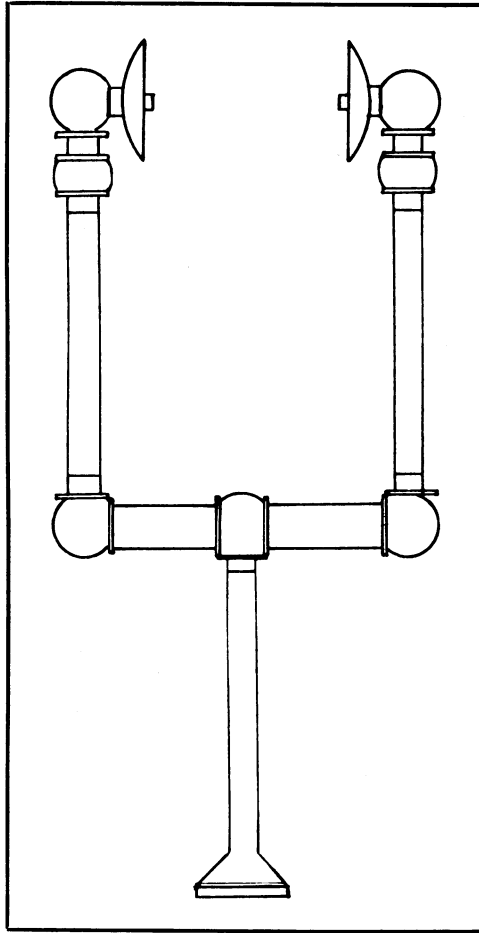
On page 430 Comins made the first published suggestion of employing both ears in auscultation, but he did not furnish a sketch of a binaural stethoscope and evidently never made such an instrument. The conjectural sketch shown is simply Comins' wooden tube stethoscope adapted for both ears. (Fig. 13a).

C. J. B. Williams, in 1843, acknowledged this idea as the father of his binaural instrument, which was also of wood.

19. DEMOUNTABLE STETHOSCOPE (before 1870) (Fig. 11).

This type, employed prior to 1870, is still used extensively in Europe. When in use, holes in side of ear-piece are covered by thumb and finger. When not in use, small end of stem passes through these holes, as shown in photograph. Easily carried in pocket. Photograph shows position when not in use.

Kindly loaned by Dr. A. R. Lamb.



13A

Conjectural Sketch of Adaptation of  
Comins' Stethoscope (1829)

*Later Development of Monaural Stethoscope*

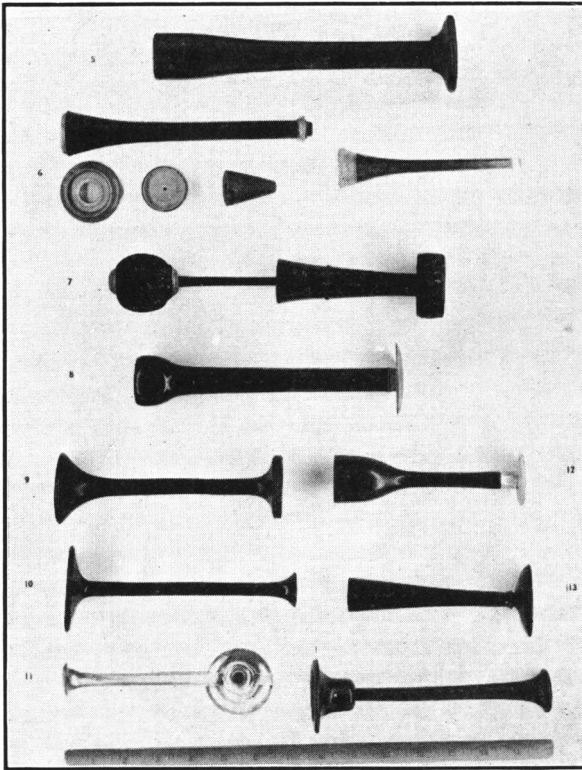
20. FLEXIBLE TUBE STETHOSCOPE (1832).

Stroud, William (1789-1858).

On mediate auscultation. *London M. Gaz.* (1841-42), n. s. 1:6-9, 1842.

Stroud, in 1832, adapted to auscultation the flexible speaking tube commonly used by deaf persons. One hand held the ebony nipple in the examiner's ear and the other held the ebony chest piece in





place. The flexible tube was made of spiral wire covered by "caoutchouc-cloth." (This easily rubberized cloth was first used about 1832; rubber tubing came much later). Stroud's instrument is shown on p. 7.

21. EXAMPLES OF STROUD'S TYPE OF FLEXIBLE STETHOSCOPE (1832) (Figs. 14 and 15).

## 22. FLEXIBLE TUBE STETHOSCOPE WITHOUT EAR-PIECE (1838).

Sibson, Francis (1814-1876).

The flexible stethoscope. *London M. Gaz.* (1840-41), n. s., 2:911-912, 1841.

In 1838 Sibson of Edinburgh dispensed with the ear-piece of Stroud's stethoscope. He simply pushed the small open end into his ear. He was thus able to use one hand to hold the instrument on the chest and with the other to feel the pulse. From his description he was evidently timing murmurs. His modification is illustrated on p. 912.

## 23. FLEXIBLE TUBE STETHOSCOPE WITH SPECIAL EAR-PIECE (1840).

Bird, Golding (1814-1854).

Observations on the advantages presented by the employment of a stethoscope with a flexible tube. *London M. Gaz.* (1840-41), n. s., 1:440-442, 1841.

Golding Bird was one of the first to use a flexible stethoscope. It was much like Stroud's save that the ear-piece was a disc cemented to the ball through which the flexible tube passed. A sketch of his instrument is shown.

## 24. BIGELOW'S COMPACT STETHOSCOPE (before 1846) (Fig. 7).

Henry J. Bigelow invented what was then considered a very convenient stethoscope of cedar. The wide side of the ear-piece could be placed against the chest and the stethoscope used thus as a pleximeter. The worsted ball covered with velvet has an ebony handle. It was used as a percussor.

## 25. EXAMPLES OF MONAURAL STETHOSCOPES (Figs. 5-13).

The ebonite stethoscope (Fig. 10) was kindly loaned by Trudeau Sanatorium.

## 26. EARLY AMERICAN MANUAL ON STETHOSCOPES (1846).

Bowditch, Henry Ingersoll (1808-1891).

*The young stethoscopist, or the student's aid to auscultation.*  
N. Y., J. & H. G. Langley, 1846.

This is a most interesting manual on auscultation. It is opened at pp. 14-15, showing various types of stethoscopes: Laennec, Piorry, Bigelow.

Bowditch was a student of Louis. The stethoscope used by him is shown in another case.

27. "THE STETHOSCOPE SONG."

Holmes, Oliver Wendell (1809-1894).

*Poems*. Boston, Ticknor & Fields, 1856, pp. 272-277.

This characteristic poem, first published in 1849 and written either in 1847 or 1848, at the time Holmes was giving up medical practice (he became Dean of the Harvard Medical School in 1846) throws a humorous light on what may have been his own and his students' early difficulties. The doctor evidently carried one of Bigelow's stethoscopes!

28. WILLIAMS, A STUDENT OF LAENNEC.

Williams, Charles James Blasius (1805-1889).

*Memoirs of life and work*. London, Smith, Elder & Co., 1884.

Charles J. B. Williams was a student under Laennec at La Charité in 1825. On pp. 40-41 of his *Memoirs* he gives some reminiscences of those days.

29. OBJECTION TO FLEXIBLE STETHOSCOPE (1840).

Williams, Charles James Blasius (1805-1889).

*The pathology and diagnosis of diseases of the chest*. . . .

4. ed. London, John Churchill, 1840.

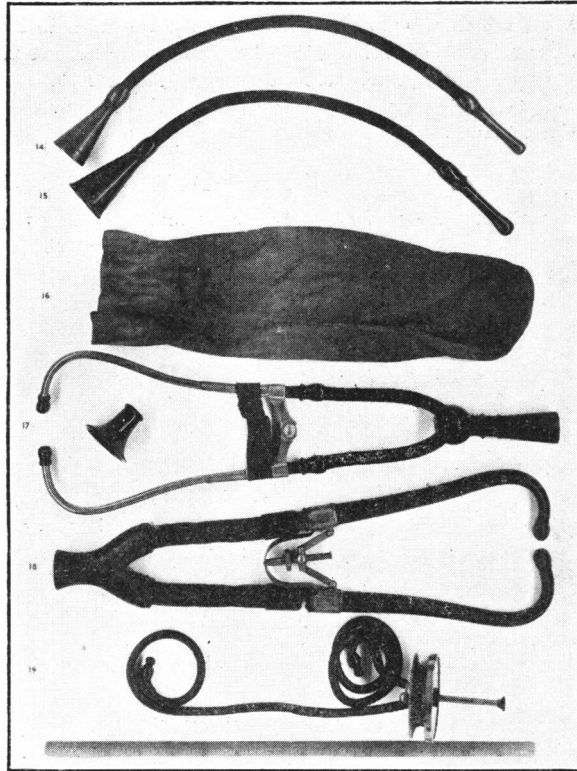
On returning to England from his studies under Laennec, Williams did much to popularize auscultation. He became an authority in his day on "consumption" and diseases of the chest. In his book on diseases of the chest, he advocates a light wooden stethoscope (shown in Plate I, frontispiece), stating his objection to the little used flexible instrument.

30. STRAIGHT WOOD STETHOSCOPE STILL IN FAVOR (1842).

Williams, Charles James Blasius (1805-1889).

On the construction and application of instruments used in auscultation. *London M. Gaz.* (1842), n. s., 1:400-404, 1843.

On p. 402 is shown another of C. J. B. Williams' light wooden stethoscopes. Fig. 3 shows a whalebone pleximeter so fashioned as to fit between ribs. Fig. 4 is a plexor, or, percussor, an instrument then frequently used to strike the pleximeter. Eventually fingers were found more satisfactory.



### *The Binaural Stethoscope*

#### 31. THE FIRST BINAURAL STETHOSCOPE (1843).

Williams, Charles James Blasius (1805-1889).

On the acoustic principles and construction of stethoscopes and ear trumpets. *Proc. Roy. Med. & Chir. Soc. London* (1873), 7:189-194, 1875.

In 1843 C. J. B. Williams, recalling the suggestion of Comins, made the first binaural stethoscope. It was awkward and inflexible, being made of wood and metal. So far no drawing of it has been found. Williams, at a meeting of the Royal Medical and Chirurgical Society, Oct. 28, 1873, stated that he constructed such a stethoscope "thirty years ago." (p. 193)

#### 32. SELF-ADJUSTING STETHOSCOPE OF CAMMANN (1855).

Self-adjusting stethoscope of Dr. Cammann. *New York M. Times*, 4:140-142, 1855.

George P. Cammann of New York City did much to improve the binaural stethoscope. In 1855 he introduced the instrument here illustrated. The chest-piece was of ebony, the ear tips of ivory, and the elastic portion of the tubes of spiral wire covered by "gum elastic" and cloth.

### 33. EXAMPLES OF CAMMANN'S STETHOSCOPES (Figs. 16-18).

The stethoscope was carried in a chamois-skin bag or in a box. Shown ready to use: the large bell chest-piece was often held before the patient's mouth while the chest was percussed, to elicit "cracked pot" sound. Smaller chest-pieces were for ordinary auscultation.

### 34. "THE AMERICAN LAENNEC."

Flint, Austin (1812-1886).

*Physical exploration and diagnosis of diseases affecting the respiratory organs.* Phil., Blanchard & Lea, 1856.

Austin Flint was sometimes called the "American Laennec." He ranked especially high as a diagnostician in diseases of the chest and did more than anyone else to bring the binaural stethoscope into general use.

He was President of The New York Academy of Medicine, 1873-1875.

His text-book is opened to the chapter on *Auscultation*.

### 35. STETHOSCOPE USED BY AUSTIN FLINT.

Presented to Frederic S. Dennis by Mrs. Austin Flint and given by Dr. Dennis to The New York Academy of Medicine.

### 36. DIFFERENTIAL STETHOSCOPE (1859).

Alison, Somerville Scott (1813-1877).

On certain auditory phenomena. *Roy. Inst. Great Britain. Notices of proc.* 3:63-70, 1859.

The instrument shown on p. 64 was devised by Scott Alison, to compare intensity of sound coming from two areas of the chest. It was not found subsequently to be of much value.

### 37. DOUBLE-BELL STETHOSCOPE (1860?).

Lyons, Robert Spencer Dyer (1826-1886).

On a double-bell stethoscope, *Dublin Quart. J. Med.*, 33:364-366, 1862.

Another stethoscope (illustrated on p. 365) for the comparison of relative intensity of sounds. This had two chest-pieces and a single ear-piece. The arms of gutta percha were slightly flexible. Both chest-pieces were to be used at the same time. It was another of the variations which proved of little value.

### 38. FIRST DIAPHRAGM STETHOSCOPE (1869).

Stern, Samuel (1839-1915).

Zur Theorie der Auskultation und Perkussion. *Wien. med. Presse*, 10:778-782; 802-803, 1869.

Samuel Stern's instrument consisted of a hollow conical tube, across the larger end of which was stretched a membranous diaphragm. The ear tubes opened separately into the hollow tube.

### 39. ECHOSCOPE (1871).

Speir, Samuel Fleet (1838-1895).

Aids for the diagnosis and treatment of certain diseases. *M. Rec.*, 6:174-175, 1871-2.

A stethoscope which could be held in place by pushing the examiner's chin against the rest marked by the arrow. Thus the examiner could use both hands in percussion. It was used during a wave of auscultatory percussion of aneurysms, effusions, tumors, etc. Description and illustration on p. 175.

### 40. EARLY DIAPHRAGM MODIFICATION (1876).

Yeates,

New form of stethoscope. *M. Press & Circ.*, n. s., 22:58, 1876.

Air forced in stopcock expanded two parallel sheet-rubber drum heads. Several students might listen at the same time by adding the necessary elastic tubes.

### 41. PAUL'S STETHOSCOPE WITH RUBBER BULB (1881).

Hudson, Erasmus Darwin, Jr. (1843-1887).

*A manual of the physical diagnosis of thoracic diseases*. N. Y., William Wood & Co., 1887.

Another effort to combine percussion and auscultation in one act resulted in the invention of this stethoscope by Constantin Paul (1881). The chest-piece was made to adhere to the patient's skin by a vacuum, leaving both of the examiner's hands free for percussion. Book opened at p. 70, showing illustration.

### 42. CALIPER-STETHOSCOPE (1881).

An addition to the binaural stethoscope. *London M. Rec.* 9:219, 1881.

Invented by Irwin Palmer, this ordinary binaural stethoscope was also used as a pair of calipers. The elastic band is replaced by a circular box-spring; a dial plate is attached to the joint. It was apparently first described in the above article.

43. A VERSATILE STETHOSCOPE! (1884).

Smith, Ebenezer Thomas Aydon.

A new form of stethoscope. *Brit. M. J.*, 1:909-910, 1884.

Its promoter admits that its main function is to promote hearing, but in case of necessity, by simply rearranging its parts, one can use it as a monaural, a binaural, or a differential stethoscope, an otoscope, a nasal tube with funnel for feeding the very ill, a nasal douche tube, a catheter, an enema tube, or a tourniquet.

44. HARD RUBBER BINAURAL STETHOSCOPE (1885).

Denison, Charles (1845-1909).

An improved binaural stethoscope. *M. Rec.*, 27:391, 1885.

Denison substituted hard rubber for the metal customarily used in the arms of the instrument. As shown in the illustration, the sound canal diminishes in diameter as it progresses from the bell-shaped chest-piece to the ear-piece.

45. DENISON'S HARD RUBBER BINAURAL STETHOSCOPE (1885).

Kindly loaned by Trudeau Sanatorium.

46. PICKERING'S "PANARKES" STETHOSCOPE (1887).

Pickering's "Panarkes" stethoscope. *Brit. M. J.*, 2:1342, 1887.

This illustrates some modifications of a single stethoscope. When used as in Fig. 1 it was manual and could be carried by internes in a button hole. As Fig. 2 it had the large ear-piece preferred by some. Fig. 3 was bimanual with flexible tubes. Fig. 4 was manual with flexible tubes. Fig. 5 shows the stethoscope serving as a handle for a percussion hammer, the ear-piece in Fig. 2 serving as the pleximeter.

47. COMBINATION MONAURAL AND BINAURAL STETHOSCOPE (1887).

Batten, Rayner Winterbotham (1835-1909).

Binaural stethoscope. *Brit. M. J.*, 2:1342, 1887.

48. MODIFICATION OF CAMMANN'S STETHOSCOPE (1885).

Cammann, Donald Muhlenberg (1852- ).

A modification of Cammann's binaural stethoscope. *New York M. J.*, 41:27-28, 1885.

A modification by Cammann of Constantin Paul's idea, in which the rubber bulb was built around the chest-piece of the stethoscope. The stethoscope was thus held by a vacuum against the chest wall.

## 49. CONSTANT EAR-PRESSURE STETHOSCOPE (1891).

Herschell, George Ariele (1856- ).

An improved binaural stethoscope. *Lancet*, 1:609, 1891.

The ear-pieces of Herschell's instrument exerted a constant pressure of the proper intensity. He substituted a clamp for the elastic loop usually used to join the auditory tubes.

## 50. GERMAN SILVER AND HARD RUBBER STETHOSCOPE (1895).

Knapp, Mark Israel (1868-1920).

A new and improved stethoscope. *M. Rec.*, 48:682-683, 1895.

By covering German silver tubes with soft rubber tubing, Knapp was able to eliminate certain extraneous sounds.

## 51. PHONENDOSCOPE (1894).

Bianchi, Aurelio.

Il fonendoscopio. *Policlin.* (sez. med.), 1:179-180, 1894.

Bianchi's own account of his phonendoscope, with illustrations.

## 52. EXAMPLE OF PHONENDOSCOPE (Fig. 19).

## 53. PHONENDOSCOPE (1896).

Manges, Morris (1865- ).

The phonendoscope. *New York M. J.*, 65:42-45, 1897.

Read before The New York Academy of Medicine, Oct. 20, 1896. Opened to show the instrument in use.

Baruch, Herman Benjamin.

The phonendoscope. *M. Rec.*, 50:624-626, 1896.

The phonendoscope, well described in this article, is a diaphragm which magnifies the usual sound. It was intended as an improvement on the usual types of stethoscope. Its advocates hoped that it would prove a great aid in outlining organs. The chest-piece was held over the organ or tumor examined, while a finger was drawn over the skin with a gentle stroking motion. As the finger approached the very edge of the organ or tumor, the sound changed its intensity strikingly. The procedure is little used today.

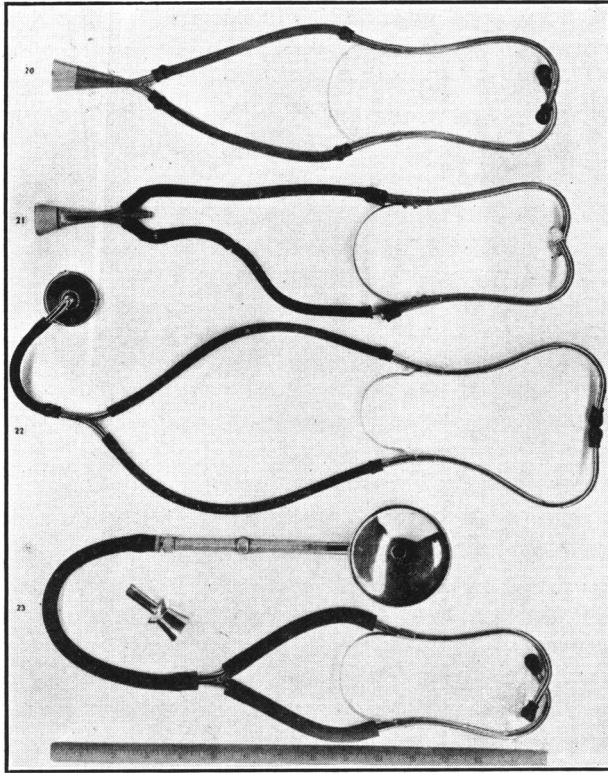
## 54. NEW STETHOSCOPE WITH ARMAMENTARIUM (1898).

Knopf, Sigurd Adolphus (1857- ).

A new binaural stethoscope with armamentarium for complete physical examination. *J. A. M. A.*, 30:27-28, 1898.

In 1898 S. A. Knopf of The New York Academy of Medicine was advocating the use of such a set. The adjustable ear-pieces, various sizes and shapes of chest-pieces, including one held to the chest wall by suction, a Flint percussion hammer, and a pleximeter are shown in the illustration.





55. COMBINATION SINGLE OR DIFFERENTIAL STETHOSCOPE (1903).

Wetherill, Henry Emerson (1871- ).

An improved form of stethoscope. *Am. J. M. Sc.*, 126:884-887, 1903.

A rather recent return to previous features in stethoscopic construction. This stethoscope (shown on p. 884) has separate chest-pieces which can be combined as one or used individually as a differential stethoscope. The flexible projections from each tube, stroked or tapped by the finger, were used in auscultatory percussion. Diaphragms could be slipped into the bells if wished.

56. TRUDEAU'S OWN STETHOSCOPE (Fig. 20).

Kindly loaned by Trudeau Sanatorium.

## 57. SIR WILLIAM OSLER'S STETHOSCOPE (Fig. 21).

Used until his death in 1919. Given by Lady Osler to the Academy's Librarian and kindly loaned by him for the exhibition.

*Modern Stethoscopes*

## 58. SIMPLE DIAPHRAGM TYPE OF STETHOSCOPE MUCH USED TODAY (1901).

Invented by R. C. M. Bowles, of Massachusetts.  
Kindly loaned by Fred Haslam and Company.

## 59. DOUGLASS STETHOSCOPE (1910) (Fig. 22).

Devised by Alfred A. Douglass. It is an improvement on the Bowles stethoscope and is more sensitive.

## 60. FETAL HEART STETHOSCOPE, "LEFFSCOPE" (1927) (Fig. 23).

Leff, Morris (1889- ).

A stethoscope for auscultating the fetal heart. *Am. J. Obst. & Gynec.*, 20:108-109, 1930.

Designed by Morris Leff. The weight of the bell (2 lbs.) ensures even contact and permits free use of the hands. A regular bell may also be used for ordinary work. Kindly presented to the Academy's Historical Museum by Dr. Leff.

*Electrical Stethoscopes*

## 61. EARLY WORK WITH ELECTRICAL STETHOSCOPE (1907).

Einthoven, Willem (1860-1927).

Die Registrierung der menschlichen Herztöne mittels des Saiten-galvanometers. *Pflüger's Arch. f. d. ges. Physiol.*, 117:461-472, 1907.

The earliest important work was done by Einthoven. He made records of normal heart sounds and murmurs in 1907, using a carbon transmitter. Others improved the recording devices.

## 62. MULTIPLE ELECTRICAL STETHOSCOPE (1923).

Cabot, Richard Clark (1868- ).

A multiple electrical stethoscope for teaching purposes. *J. A. M. A.*, 81:298-299, 1923.

In 1923 H. B. Williams, Richard C. Cabot, and C. J. Gamble developed an electrical stethoscope suitable for group instruction. A recording galvanometric attachment gave visual records of what was heard.

63. MULTIPLE ELECTRICAL STETHOSCOPE (1924).

Gamble, Clarence James (1894- ) & Replogle, D. E.

A multiple electrical stethoscope for teaching. *J. A. M. A.*, 82:387-388, 1924.

The instrument is here described in considerable detail. References are given to the work of others on the subject.

64. PHOTOGRAPHS OF ELECTRICAL STETHOSCOPE DEVELOPED BY CABOT, GAMBLE (*et al*) AND THE WESTERN ELECTRIC COMPANY.

1. The instrument.
  2. Drs. Cabot and Gamble using the electrical stethoscope.
  3. The electrical stethoscope in classroom instruction.
- Photographs kindly loaned by the Bell Telephone Laboratories.

65. ELECTROSTETHOGRAPH (1934).

The latest, and as yet unpublished, work in recording murmurs. It should be remembered that in order to obtain the best records the murmur is first located in the usual manner and then the electro-stethograph is used to read it. The photographs show:

1. Cambridge electrostethograph for amplifying heart sounds.
2. Normal electrostethogram taken over three areas.
3. Electrostethogram taken over three areas: condition, aortic stenosis, Flint murmur.
4. Electrostethogram taken over three areas: condition, aortic stenosis.

Photograph no. 1 kindly loaned by the Cambridge Instrument Company, New York City; photographs nos. 2, 3, 4 by the Department of Physiology, Columbia University.

